by FRANCIS G. MASSON and JOHN B. BODDIE

Factors Affecting U.S. Merchandise Exports

AMONG the various transactions affecting the balance of international payments, merchandise exports are the largest in dollar value and their movement therefore is of great importance. In addition to the influence in the balance of payments export demand is also a major factor influencing domestic production. Unlike imports, which are closely related to domestic business activity, exports are dependent much more heavily on developments outside the domestic economy. The influence of exports both on the balance of payments and on domestic business activity is all the more pronounced because exports are characteristically volatile. For example, in recent years they moved from a high (excluding military grant aid) of $19.5 billion in 1957 to a low of $16.4 billion in 1958 and 1959, and back to $21.7 billion (annual rate) in the middle of 1962. In recent months another decline has set in.

Various steps have recently been taken to improve the balance of payments by stimulating exports. The effect of these programs may have been reinforced by the rise in prices and wage costs in other industrialized countries relative to our own prices, thus tending to improve our competitive position in international markets. Potentially offsetting these export-inducing developments was, however, the growing integration of the Common Market countries, creating greater incentives for trade among themselves and raising the competitive handicaps for outsiders. The Common Market area includes the six EEC countries, associate members of the EEC, and dependent overseas territories.

Other developments affecting our foreign trade are Government grants and capital outflows to other countries, and for a large share of such grants and loans, a shift from internationally competitive procurement of the goods supplied to the recipient countries to procurement in this country. Also important are direct foreign investments and other private capital outflows which may stimulate exports while the capital is transferred, but, in some instances, may contribute to the construction abroad of productive facilities which compete with our domestically produced goods.

It is of interest, of course, to separate as far as possible the effects of these different factors on export movements, and to measure the speed and intensity with which their effects are transmitted. From one standpoint this has previously been done by breaking down exports by commodity groups and by countries of destination, and examining changes in each of these cells over selected time periods. This method has been used in the articles on merchandise trade in the December issues of the *Survey of Current Business* in 1962 and in earlier years.

In this article a more general and integrated approach is applied in an effort to show what the effects of various factors were, on the basis of recent past experiences, and to indicate how much of the changes are explained by the selected factors, and to consider whether new forces may have diverted exports from the pattern which could have been expected as a consequence of the economic forces which have been examined.

The major factor which has been examined with respect to its influence on U.S. exports is foreign business activity. Just as in the United States imports are largely (but not entirely) influenced by the demand originating in the domestic economy, demand originating in foreign countries is the predominant factor, to a greater or lesser extent, in explaining their demand for U.S. goods. Demand alone is not the only determinant, however; availability of foreign exchange is another. For some countries which have sufficient foreign exchange income, or adequate reserves of gold and foreign currencies to be used to stabilize their imports if necessary, demand is the decisive factor. This situation applies generally during recent years in the more advanced industrial countries of Western Europe and in Japan.

The availability of foreign exchange resources is a more decisive factor for the generally less developed countries. The latter receive their foreign exchange from sales to, and capital inflows from, the more developed countries, i.e., Europe, the United States, and Japan; and their imports, therefore, are to a large extent a function of demand in these advanced countries and of capital imports from them. This influence is not merely transmitted through changes in foreign exchange availabilities of the less developed countries.[1] Business conditions in the latter countries, and hence their demand itself, is also based on incomes earned in industries exporting raw and semimanufactured goods to the more industrialized countries.

Basic factors affecting exports

As a working hypothesis for the statistical analysis it has been assumed, therefore, that the major factors affecting total world demand for our exports

1. These nations, as a group, have not used their foreign exchange reserves in such a manner as to stabilize their imports. While some countries lose reserves in a particular year, others are in the process of replenishing theirs. The adjustment in imports is often accomplished more directly through the relaxation or the tightening of exchange control measures.

are business activity in the advanced industrialized countries, and capital flows from the United States to Canada and to the underdeveloped countries. The foreign countries, consequently, have been divided into two principal groups: the industrially advanced countries, comprising Western Europe and Japan, and the other countries relying for their foreign exchange receipts, and to a large extent also for their domestic incomes, on exports of crude and semi-finished products. A separate consideration was given to Canada, however, because of the large share of our exports going there. At the same time, its relatively stronger foreign exchange position and greater industrial development make possible some independence in its economic activity, although business conditions in Canada have been strongly influenced by those in this country.

Not all of our exports are closely related to business activity in industrially advanced countries. A large part consists of foodstuffs and tobacco, which are more affected by other conditions, including agricultural policies in the United States and abroad. The large fluctuations in the exports of cotton have often reflected shifts in U.S. support and marketing policies. For these reasons, and also because a large part are financed by various foreign aid programs, exports of agricultural goods were not included in the analysis. Also omitted from consideration were exports of civilian aircraft, which are concentrated in relatively short periods, and unusual temporary exports of petroleum and products during the Suez crisis at the end of 1956 and the first half of 1957.

The procedure followed is to obtain relationships between U.S. exports for each of the three areas—Western Europe and Japan, Canada, and the rest of the world (essentially the underdeveloped countries but comprising also such advanced but mainly raw material and foodstuffs exporting countries as Australia and South Africa)—and the factors indicated above as strategic in explaining our exports. Since certain of the causal factors, such as capital flows and industrial fluctuations, may have strong effects within relatively short periods of time, the analysis is based on quarterly series, adjusted for seasonal and certain irregular movements such as occurred during the Suez crisis in 1956–57.

Because some variables (such as industrial production in the United States, Canada, and other industrialized countries, and exports to Western Europe and Japan) exhibit strong upward trends, it is desirable to eliminate from the actual data the "growth" element. Since it is not clear that the growth tendency can be determined for periods of less than a decade, the trends are computed on the basis of a longer period. The trend in exports to industrial countries is estimated from peaks and troughs over the past 10 years. The deviations of actual exports from this trend during the 24 quarters preceding the third quarter of 1962 are then examined to determine whether a close correlation exists between exports to these areas and output abroad, capital flows and other economic changes.

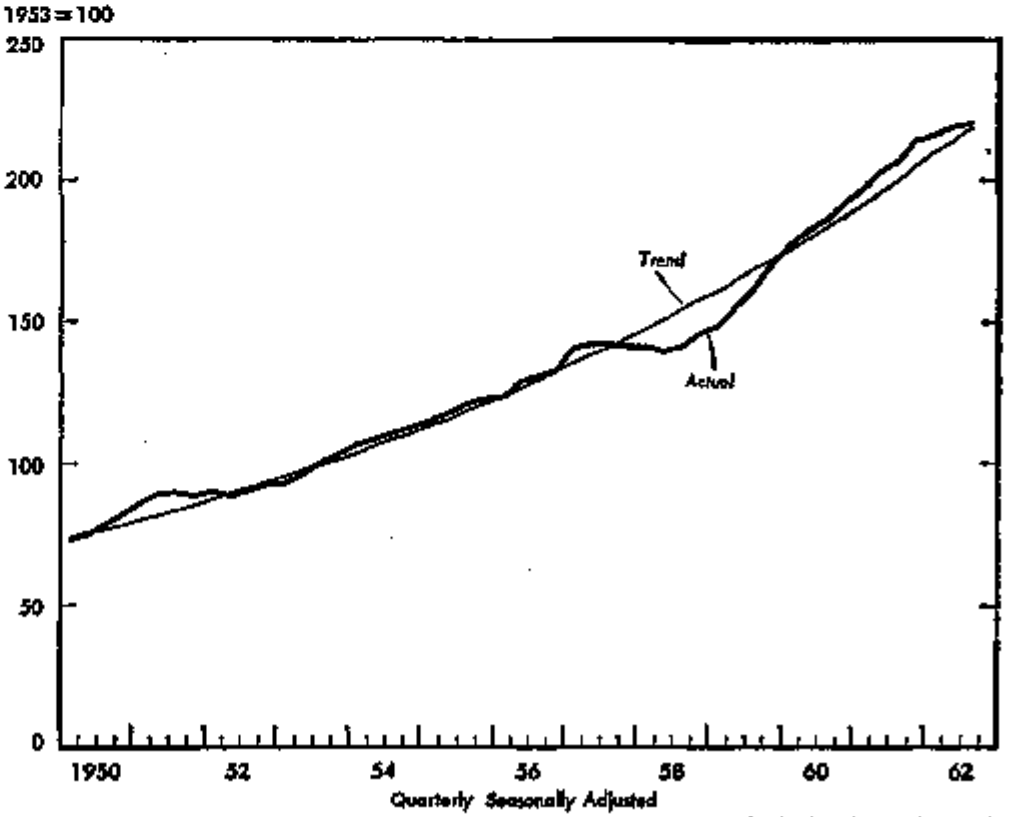
Price relationships and other influences

For each of the three areas, attempts were made to test the possible effects of price relationships between the United States and other industrialized countries, but these relationships do not appear to add to the explanations of the movements in exports. Since 1956, the prices of finished manufactures in Western Europe and Japan have been relatively flexible. In the United States, on the other hand, price levels rose until 1958 and remained relatively stable since then. As a result, the relative price changes were more or less similar in direction to the changes in the production of the other advanced countries around the average rate of growth. Hence the relative price effect on exports cannot readily be distinguished from that of industrial production.

In addition to prices, another element of the competitive position of U.S. goods is the degree to which American

INDUSTRIAL PRODUCTION OF WESTERN EUROPE AND JAPAN*

Has Grown at an Average Annual Rate of 9 Percent Since 1950



* Weighted by U.S. exports to these countries 1953–61

Data: See Technical Note, Equation 3

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business firms are able to design, market and find financing for export sales. As previously noted, such activities have recently received greater attention, strongly supported and promoted by the programs of various U.S. Government agencies. As is the case with respect to prices, it has not been possible so far to quantify the effects of these programs on exports, or to isolate their effects from those of the other factors analyzed.

Another factor, which may be important but which could not be tested because of lack of appropriate data, was the effects of Government aid programs, other than Export-Import Bank loans. These programs affect U.S. exports to the extent that they directly finance U.S. exports, and they may also affect them if assistance is provided in the form of dollar transfers which the countries are free to spend. In more recent periods, exports under these assistance programs have become more prevalent, and may explain why exports to these countries tended to exceed the estimates calculated on the basis of relationships developed for the period 1956 to the middle of 1962.

Major findings

1. Nonagricultural exports to the industrialized countries (Western Europe and Japan) have been largely explained by industrial production in these countries. Deviations from the average rate of growth in industrial production corresponded closely to deviations of exports from the trend. The impact of industrial fluctuations abroad on exports was felt most strongly during the same quarter, but a lag of about one quarter can be observed around turning points.

2. Of our exports to Canada, about 80 percent were relatively constant, reflecting the stability of Canadian earnings from the exports of products the demand for which is relatively unaffected by cyclical business developments. Of the portion which is subject to cyclical fluctuations, the following factors appeared to explain the movements: (a) industrial production in the United States, (b) the outflow of U.S. capital in the form of direct investments, and (c) the changes in industrial production in Canada itself to the extent that they are not caused by (a) and (b).

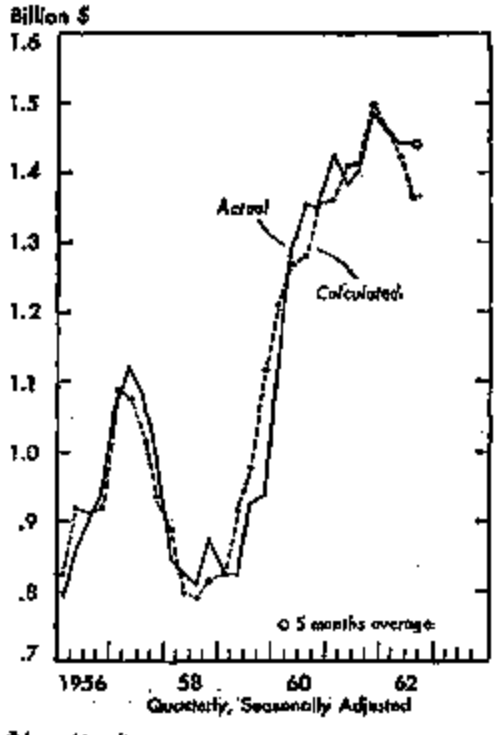
3. The major influences on U.S. exports to all other countries are similar to those explaining Canadian demand. Production in other industrialized countries, however, rather than production in the United States has seemed to dominate the cyclical movements in their foreign exchange earnings. Capital outflows from the United States, including Export-Import Bank loans, were found to be another major factor accounting for changes in U.S. exports to the underdeveloped countries. The effect of these factors was felt most strongly after a lag of one quarter.

The current situation

Events during the course of 1962 tended to follow the pattern suggested by the preceding analysis. The combined industrial production index of Western Europe and Japan crossed below its growth trend during the fourth quarter, registering a gain during the year of less than its long-run average. This brought to an end the cyclical upswing in production which began in 1959, during which exports to the industrialized countries were also advancing at exceptionally high rates.

U.S. NONAGRICULTURAL EXPORTS* TO WESTERN EUROPE AND JAPAN

Are Closely Related to Industrial Production in These Countries



* Less Aircraft

Data: See technical Note, equation 2

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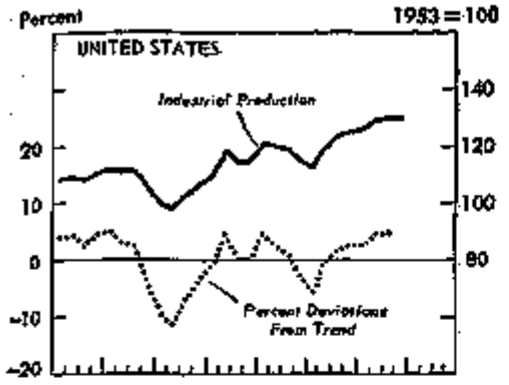
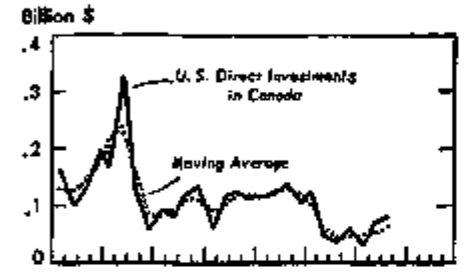
Although export data are not yet available for the entire year, exports during the third and fourth quarters of 1962 exhibited irregular movements due to the dock strike on the U.S. Atlantic and Gulf coasts early in October and again at the end of December. Shipments immediately before the strike, in September, were exceptionally high; they fell off sharply in October, but rose again in November. The change in exports since the middle of the year may be estimated by means of the July-November average, seasonally adjusted, rather than by using quarterly data. On the basis of this estimate, nonagricultural exports to Western Europe and Japan remained about the same between the second and third quarters, while estimates based on past relationships with industrial production would have indicated a decline by about $100 million. As indicated below, however, U.S. exports seem to lag during the early periods of a change in the cyclical movement of production in these countries.

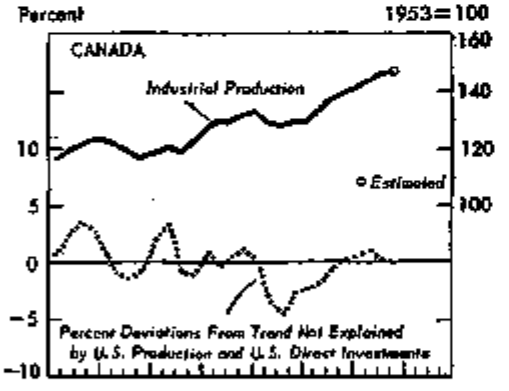
Direct investment outflows to Canada and the underdeveloped countries also fell in 1962. Exports to Canada, although presumably sustained by the continuing climb in production in this country and in Canada itself, nevertheless fell slightly, seasonally adjusted, although the relation between exports and direct investment, U.S. production and Canadian production indicated no decline. Canadian import restrictions imposed last summer probably accounted for much of this discrepancy. A shortfall of actual exports relative to the calculated amount occurred also during the previous peak in 1959–60, however.

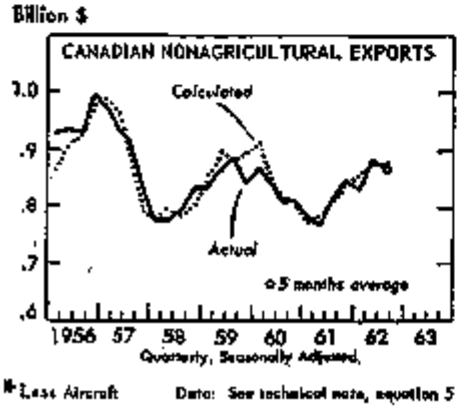
Exports to all other countries rose by $28 million, which is a greater rise than would be expected on the basis of the factors which account for exports to this area. Much of that can be traced to exports under aid programs, particularly to India and Pakistan.

FACTORS INFLUENCING U.S. NONAGRICULTURAL EXPORTS* TO CANADA









*Less Aircraft Data: See technical note, equation 5

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Exports to industrial countries

Economic activity in these countries is the major factor in determining the volume of U.S. exports to them. (See chart on page 22.) Since 1953, industrial production in Western Europe and Japan has fluctuated around an average increase of 9 percent annually, and deviations from this growth trend have varied between a high of 4 percent over it in the fourth quarter of 1961 and a low of 8 percent under it in the third quarter of 1958. The secular trend in our exports may be associated with this long-term growth rate. In 1962 prices, the long-run upward trend in exports is $233 million annually. The growth in exports greatly exceeded this figure when industrial production abroad was advancing more rapidly than the average, and fell short or declined when production abroad advanced slower than the average rate.

A systematic relation between industrial fluctuations in Western Europe and Japan and exports to these countries has been evident to a greater extent since 1956 than prior to that year. In the early postwar period exports were strongly influenced by direct controls on imports in several countries and other economic and financial disturbances affecting their foreign exchange position, and by U.S. Government aid rather than by demand itself.

In the first half of the 1950's, as production in Europe and Japan expanded, it met a larger part of the domestic demand, and by increasing exports, also provided larger foreign exchange earnings. Restrictions on imports could gradually be relaxed, therefore, and foreign demand itself emerged as the decisive factor determining imports. The emergence of this relation in 1955–56 marks the close of the postwar era—the point at which productive capacity abroad was adequate to supply domestic and foreign requirements for goods except during periods of very intense demand pressure. Also, the great reserve capacity of industry in the United States and slow growth in domestic U.S. demand made it possible for foreign demand to be reflected rapidly in expanded exports to foreign countries.

Since 1956, therefore, the relation between annual rates of growth in production of the other industrial countries and changes in U.S. exports has been a relatively stable one. The change associated with a 1-percent acceleration of the foreign growth rate is of the order of $170 to $200 million. When foreign production is growing significantly more rapidly than the average rate of 9 percent annually, exports accelerate somewhat more as production rises. In other words, the change in exports associated with a 1-percent advance in the growth rate is closer to $200 million when production growth is higher than the average and closer to $170 million when production growth is lower than the average. This modest shift in the relation suggests that exports have expanded slightly more rapidly when European and Japanese plants have pressed against capacity during business-cycle peaks.

The composition of our nonagricultural exports to other industrialized countries largely explains the great influence of the rate of change in production. Roughly 90 percent are industrial materials and fuels or capital goods, while consumer goods excluding foodstuffs account for only 6 percent. If consumer goods were to expand in the future relative to the total, exports might become more responsive as well to the level of production and consumer incomes of these countries.

It appears from this analysis that since 1956 U.S. exports to the industrialized countries ceased to expand when industrial production in these countries increased by less than about 7 percent annually. Since other factors may assume greater importance in the future, it should not be concluded that this relationship will necessarily hold. As growth in production dropped below this figure, exports tended for two or three quarters to fall somewhat less rapidly than implied by the relation, although the lag disappears as the trough is approached. Likewise, actual exports seemed to have lagged somewhat during the early phases of the upswings in 1956 and 1959. In the latter year, the steel strike in the United States may also have contributed to the more sluggish rise in U.S. exports. It appears, however, that for the period as a whole, a simultaneous relation

between fluctuations in industrial production abroad and changes in U.S. exports is slightly better than one in which exports are lagged by one quarter.

Although, as noted above, price relationships did not appear to have a significant effect on U.S. exports because of the close association with changes in production, a new pattern may be emerging. Prices of finished manufactures in Western Europe and Japan, expressed in terms of U.S. dollars, were flexible relative to our prices after 1955. While production abroad rose rather steadily, the pause in economic expansion during 1958–59 was sufficient to cause prices to fall sharply abroad while the U.S. index remained stable. Thereafter, prices abroad rose together with the industrial production trend. As the expansion accelerated, the revaluation of the German deutsche mark and the Dutch guilder in 1961 further contributed to the price advance. The relation between U.S. and foreign prices, which had been favorable to the other industrialized countries during most of the period, was restored to what it had been in 1956. In 1962, economic growth abroad proceeded at a slower pace, but prices continued their upward trend through the third quarter. If this divergence should continue, its effects on exports could become apparent in 1963.

Factors influencing exports to Canada

U.S. exports to Canada are affected by industrial production in this country and in Canada, and by U.S. direct investment capital flows to Canada. (See chart on page 23.) There is, in addition, a large share of the total which has been comparatively stable. Canada's foreign exchange earnings and her economic activity affect her purchases in this country of goods and services. In addition, Canadian production is itself a result of both external and domestic forces. Business conditions in the United States have a two-fold influence on U.S. exports to Canada—both directly since our imports of merchandise as well as services provide the means for Canada to pay for our exports and indirectly, as fluctuations in U.S. industrial production are quickly transmitted to Canada. Direct investment capital flows to that country also account for some exports directly, and indirectly greatly influence the Canadian business cycle. These flows also provide a major source of Canada's foreign exchange.

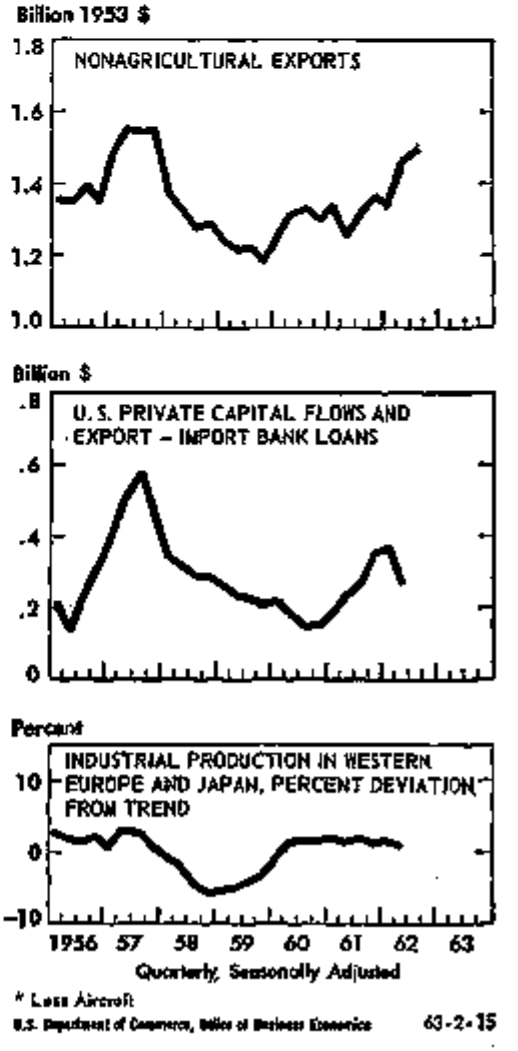
The interaction of U.S. and Canadian business cycles and U.S. investment in Canada, and their combined impact on Canadian purchases of goods from the United States, is further conditioned by salient aspects of Canada's bilateral balance of payments with the United States. Transfers of interest and dividends arising from previous capital inflows, and travel expenditures, represent growing components of Canada's payments, and various services transactions, as well as capital inflows in other forms than through direct investments, contribute to Canadian receipts. During the 6 years from 1956 to 1961, stabilizing movements of foreign exchange reserves have been insignificant. Our exports to Canada therefore closely reflected foreign exchange earnings. Net changes in other international transactions by Canada were not large enough to disturb that relationship significantly.

The rapid expansion in Canadian production, which began in 1954 and topped out in 1956, was accompanied by heavy U.S. investment in Canadian resource industries and was characterized by very substantial increases in Canada's imports of construction and industrial machinery. U.S. exports of metals and manufactures, coal and petroleum were also stimulated. As the favorable effect on Canadian business conditions of the capital outflow and of economic expansion in this country began to recede in 1957, U.S. exports slipped off and have since remained relatively constant. A similar growth in exports of investment goods and fuels to Canada was not repeated in either of the two subsequent upswings.

Nevertheless, the "autonomous" changes in Canadian industrial production (i.e., those independent of U.S. production and U.S. investment in Canada) have not increased in importance relative to the other two factors assumed to be predominant in explaining U.S. exports to Canada. It appears that each was about equally strong for the entire period. U.S. industrial production had a slightly greater overall effect than the other two. Exports to Canada during the first three quarters of 1962 did not fall far short of what would have been expected on the basis of relationships with these factors over the entire 1956–62 period. The fact that irregularly large shipments of military equipment of almost $60 million took place during the first and second

MAJOR FACTORS AFFECTING LONG-TERM CHANGES IN U.S. NONAGRICULTURAL EXPORTS*

To Countries Other Than Western Europe, Japan, and Canada



* Less Aircraft

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quarters, in combination with the depressing effect on exports of a drop in the Canadian exchange rate and the imposition of extraordinary import levies, do not greatly alter the picture.

In the future, exports to Canada may be depressed for a period while the monetary reserves in Canada are increasing. The effects of the other factors analyzed in causing fluctuations in Canadian exports, however, are not likely to be altered unless very great changes occur in the demand for Canada's staple exports.

One feature of the relationship between Canadian foreign exchange receipts and imports is the apparent constancy of the bulk of these receipts. Canadian exports of foodstuffs, paper, wood pulp, uranium and petroleum have not varied greatly over the business cycle. The fluctuations explained by the U.S. business cycle may be due to greater income-elasticity of demand for such Canadian export products as metals (copper, lead, zinc and iron ore), lumber and wood products. Cyclical changes in European industrial production do not appear to have had a significant effect on exports to Canada. Canadian trade with Europe has been too stable for it to have caused significant fluctuations in Canada's capacity to import.

Overall, there is no evidence that divergent movements in the prices of finished manufactures in the United States and the other industrialized countries affected our exports to Canada.

Exports to countries except Western Europe and Japan

Our exports to the other countries, whose exports consist mainly of foodstuffs and industrial raw materials, have in recent years been roughly the same in dollar volume as those to Western Europe and Japan. A number of important characteristics distinguish the behavior of exports to these countries, however. First, although exports to these countries have increased since 1953, the total to this group of countries exhibits no definite trend. Exports to the Near East, Australia and Oceania rose with some degree of regularity, and exports to Africa and the Far East fluctuated to a somewhat greater extent. Those to Latin America, on the other hand, leveled off in 1957 and have since fallen by nearly 30 percent. This decline is clearly involuntary, and is attributable to the very great drop in the capacity of the Latin American countries to finance higher imports.

The imports of the underdeveloped countries, even more than those of Canada, depended upon their foreign exchange receipts. Typically, these countries send foodstuffs and industrial raw materials to industrialized countries in exchange for manufactured goods. Purchases by the United States represent roughly one-fourth of their export earnings. This fact was of great importance during the postwar period because some of the proceeds from exports to countries with inconvertible currencies could not be spent in the United States. More recently, the distinction between currencies earned by the foodstuffs and raw material exporting countries has been of lesser importance since the currencies of all industrialized countries could be converted into dollars.

Another major difference is that the large trade deficit of these countries with the United States is covered only in part by sales to industrialized countries or by private capital flows from the United States and Europe. These countries, in the aggregate, depend on large amounts of Government loans and grants for the maintenance of imports.

The demand for the exports of these countries consists of two parts, which may be distinguished by their degree of sensitivity to cyclical fluctuations in demand. A very substantial portion of the total is not subject to major fluctuations; it includes foodstuffs such as coffee, tea, cocoa, sugar, spices, bananas, meat and dairy products, as well as certain minerals, in particular gold and tropical woods. The demand for petroleum is also somewhat insensitive to the business cycle in industrial countries, although this is to some extent a consequence of quantitative import restrictions and bilateral purchasing arrangements which restrain the free play of economic forces. On the other hand, the prices and output of a number of other exports—in particular industrial raw materials—show large fluctuations. The impact of the changes in demand on producer countries is accentuated by the high degree of concentration of virtually every underdeveloped country on a few export staples. In Latin America, for example, all countries except four receive more than half of their export receipts from a single product.

The structure of the underdeveloped economies and of the markets in which their exports are sold is reflected in the behavior of their imports. Imports of consumer goods are curtailed by quantitative restrictions, imposed largely for balance-of-payments reasons, and investment goods are admitted more freely. The fluctuations in exports to these countries are related to the deviations of production in industrial countries from the average rate of growth. Some explanation of the behavior of these exports can also be obtained from the capital outflow from the United States, including private direct investments, short-term and long-term loans provided by both private banks and the Export-Import Bank.

Exports to these countries were not significantly affected by changes in industrial production in the United States, or by an index of import prices of primary products.[1] The tie between the underdeveloped countries and Western Europe and Japan is, however, sufficiently close for a statistically significant relation to be obtained between U.S. exports to the underdeveloped countries and deviations from the average rate of growth in Western Europe and Japan. It was found that U.S. exports are most closely related to industrial production in the other areas and capital outflows from the United States, if exports are lagged behind these other series by one quarter. (See chart on page 24.)

1. The influence of prices for primary products may be subsumed under capital outflows, since capital outflows from the United States to underdeveloped countries are influenced in the long run by prices of primary products.

Additional research is required with respect to the influence of Government aid programs and special sales of surplus agricultural products. Appropriate quantitative data are not currently available for testing the degree to which such programs affect exports of nonagricultural goods. The role of such programs in a changing world may vary, depending upon the phase of the business cycle in which grants are made, the degree to which foreign exchange saved through special agricultural transactions and dollar transfers is freely spent on dollar imports, and other factors. The effect of the tying of aid programs to U.S. exports is a possible explanation of the fact that exports to underdeveloped areas have recently tended to exceed the estimates calculated on the basis of production in Western Europe and Japan and capital outflows from the United States.

Technical Note

The relationships between U.S. exports and various economic data, upon which this article is based, were derived by means of multiple regression analysis of adjusted quarterly time series from 1956 through the second quarter of 1962. They result from exploratory work on various balance of payments transactions which is currently being performed in the Balance of Payments Division, Office of Business Economics.

Exports to all areas were adjusted by removing agricultural commodities and aircraft and parts (Census category 825). The series were deflated by the U.S. price index for "Finished Goods—Goods to Users," which is a component of the wholesale price index prepared by the Bureau of Labor Statistics, adjusted to the base 1953=100. The data were then seasonally adjusted.

Extraordinary exports of petroleum during the period from the fourth quarter of 1956 through the third quarter of 1957 were eliminated by passing a straight line through the petroleum export data and substituting the values on that line for the actual data. The trend was calculated from the resultant series for Western Europe and Japan by fitting a center line halfway between two lines: one connecting the peaks and the other connecting the troughs. The trend equation is:

(1) $Y_c = 595.5 + 14.58t$

with origin at the first quarter of 1953, $t=1$ quarter.

Ratios of the adjusted export data to the trend values were correlated with: X_1, the ratio of a price index of finished manufactures in Western Europe and Japan to a comparable index for the United States; and X_2, percentage deviations from the average growth in industrial production of these countries. The first factor did not add significantly to the explanation of changes in the volume of exports. The final estimating equation for percentage deviations from the export trend is:

(2) $\log Y_{1c} = 2 + .01592\ X_2$

R^2 Adjusted for degrees of freedom=.912. Average absolute percent deviation based on actual and calculated export data=4.0 percent.

The industrial production index is prepared from seasonally adjusted indexes for Belgium, Netherlands, France, Germany, Italy, United Kingdom, and Japan, weighted by the average value of U.S. exports to these countries from 1953 to 1961. Its trend equation from 1953 through the second quarter of 1962 is:

(3) $\log Y_c = 2.15596 + .00473\ X$

origin at end of 1957.

The observation for the fourth quarter of 1959 was omitted in calculating the estimating equation because exports during the period appeared to have been influenced by the steel strike in this country. Various lags of exports behind the explanatory variables were introduced with no improvement in the fit of the estimating equation, but a one-quarter lag seems to result in a correlation almost as good as the one used here.

Canada

Exports to Canada were correlated with: X_1, percentage deviations from the average growth in industrial production in Western Europe and Japan, weighted by the average value of Canada's exports to these countries from 1953 to 1961; X_3, the ratio of a price index of finished manufactures in Western Europe and Japan to a comparable index for the United States; X_3, percentage deviations from the average growth in production from 1953 through the second quarter of 1962 in the United States; X_4, U.S. private direct investment in Canada smoothed by a 1–2–1 weighted three-term moving average; X_5, the residuals from an equation which relates deviations from trend from 1953 through the second quarter of 1962 in industrial production in Canada to items X_3 and X_4. This equation is:

(4) X_5=percentage deviations from trend in Canadian production—$[-1.79 + .431\ X_3 + .021\ X_4]$.

R^2 Adjusted for degrees of freedom =.57. The standard error of estimate is 2.06 percent. The trend equation for Canadian industrial production referred to in (4) is:

(4a) $\log Y_c = 2.07593 + .00195\ X$

origin end of third quarter 1957.

The two factors X_1 and X_2 were not significant. The final estimating equation is:

(5) $Y_{2c} = 704.4 + 8.814 X_3 + .798\ X_4 + 16.249\ X_5$.

R^2 Adjusted for degrees of freedom =.87. Average absolute percent deviation based on actual and calculated export data =3.4 percent.

Various lags were introduced with no improvement of the fit.

Countries other than Western Europe, Japan, and Canada

Exports to other countries were correlated with: X_1, percentage deviations from the average growth in industrial production in the United States; X_2, the ratio of a price index of finished manufactures in Western Europe and Japan to a comparable index for the United States; X_3, an index of industrial production of Western Europe and Japan, weighted by the average value of exports from these other countries to Western Europe and Japan from 1953 to 1961; X_4, the sum of U.S. private direct investment outflow to these countries, and net Export-Import Bank and private bank loans to these countries smoothed by a 1–2–1 weighted three-

term moving average. X_4 also includes net investment in shipping companies operating under the flag of the Bahamas, Panama, Honduras, and Liberia, since the exports include U.S. vessels transferred to these flags.

The two factors X_1 and X_2 were not significant. The final equation was:

(6) $Y_{3_t} = 1190 + 18.82X_{3_{t-1}} + .563X_{4_{t-1}}$

R^2 Adjusted for degrees of freedom = .78.

Introduction of lags other than of one quarter did not improve the fit, nor did correlation of exports with the U.S. unit value index of crude foodstuffs imports add to the explanation.

Manufacturers' Unfilled Orders, 1948–62

(Billion dollars, adjusted for seasonal variations)

Year and month	Total manufacturing	Durable	Nondurable	Year and month	Total manufacturing	Durable	Nondurable	Year and month	Total manufacturing	Durable	Nondurable
1948				**1953**				**1958**			
January	30.09	25.44	4.65	January	77.73	74.80	2.93	January	49.14	46.56	2.58
February	29.69	25.10	4.59	February	77.07	73.91	3.16	February	47.83	45.33	2.51
March	29.76	24.95	4.80	March	76.44	73.14	3.29	March	47.24	44.75	2.49
April	29.38	25.20	4.59	April	75.72	72.37	3.36	April	46.63	44.10	2.52
May	29.51	25.10	4.40	May	75.51	72.17	3.36	May	46.45	43.94	2.52
June	29.82	25.55	4.27	June	74.39	71.02	3.31	June	46.40	43.86	2.54
July	29.46	25.77	3.69	July	72.49	69.36	3.09	July	46.43	43.96	2.47
August	28.41	25.01	3.50	August	70.17	67.35	2.82	August	46.37	43.70	2.67
September	28.28	25.72	3.25	September	67.37	64.54	2.84	September	46.05	43.56	2.69
October	28.29	25.16	3.13	October	64.89	62.13	2.76	October	46.24	43.66	2.78
November	27.97	24.88	3.09	November	62.75	60.08	2.67	November	46.30	43.93	2.37
December	27.16	24.27	2.89	December	60.28	57.76	2.52	December	46.95	44.10	2.85
1949				**1954**				**1959**			
January	25.94	23.16	2.78	January	58.09	55.51	2.58	January	47.87	44.97	2.90
February	25.06	22.57	2.43	February	56.16	53.60	2.56	February	49.06	46.00	3.06
March	23.85	21.61	2.24	March	54.24	51.78	2.47	March	50.04	46.87	3.17
April	22.76	20.56	2.20	April	52.74	50.06	2.57	April	50.54	47.34	3.20
May	21.85	19.79	2.15	May	51.36	48.58	2.78	May	50.45	47.17	3.28
June	20.78	18.78	2.04	June	49.79	46.98	2.81	June	50.52	47.26	3.25
July	20.09	18.01	1.99	July	48.40	45.70	2.70	July	50.40	47.14	3.26
August	19.78	17.59	2.19	August	47.39	44.68	2.71	August	50.42	47.16	3.26
September	19.96	17.50	2.47	September	47.50	44.52	2.78	September	50.38	47.61	3.26
October	20.21	17.74	2.47	October	48.28	45.57	2.72	October	51.54	48.56	3.29
November	20.68	18.13	2.55	November	47.39	44.60	2.79	November	51.52	48.20	3.32
December	21.01	18.57	2.44	December	47.24	44.35	2.90	December	51.55	48.08	3.47
1950				**1955**				**1960**			
January	21.67	19.15	2.52	January	47.61	44.60	3.02	January	51.85	47.68	3.47
February	23.05	19.35	2.68	February	48.05	44.82	3.13	February	50.13	46.77	3.35
March	22.85	19.79	2.57	March	48.95	45.72	3.23	March	49.53	46.30	3.22
April	22.84	20.20	2.64	April	48.99	45.89	3.10	April	48.44	45.32	3.13
May	23.70	20.89	2.82	May	49.36	46.29	3.07	May	48.16	45.13	3.03
June	24.99	21.94	3.04	June	50.05	46.90	3.19	June	47.92	44.92	3.01
July	28.82	24.73	3.60	July	50.97	47.53	3.44	July	47.80	44.87	2.94
August	33.50	29.19	4.11	August	51.90	48.37	3.53	August	47.34	44.50	2.83
September	36.16	31.98	4.18	September	52.91	49.46	3.45	September	47.19	44.37	2.82
October	37.96	33.66	4.32	October	54.46	50.91	3.57	October	46.37	43.60	2.77
November	39.35	34.91	4.44	November	55.84	51.69	3.64	November	45.96	43.19	2.77
December	41.77	37.03	4.74	December	56.94	53.37	3.57	December	45.51	42.89	2.62
1951				**1956**				**1961**			
January	48.02	42.53	5.49	January	58.01	54.21	3.81	January	45.25	42.52	2.73
February	51.97	45.97	6.00	February	58.56	55.02	3.54	February	45.27	42.49	2.77
March	55.01	49.73	6.28	March	58.74	55.32	3.42	March	44.37	42.51	2.86
April	58.94	52.82	6.12	April	59.22	55.81	3.39	April	43.93	42.07	2.86
May	61.19	55.48	5.71	May	60.16	56.98	3.15	May	43.22	43.20	3.02
June	63.02	57.98	4.94	June	60.82	57.74	3.08	June	45.30	43.31	2.00
July	63.73	59.47	4.26	July	61.02	58.02	3.11	July	45.95	43.02	3.09
August	64.58	60.69	3.89	August	63.42	60.29	3.13	August	47.19	43.97	3.12
September	65.18	61.64	3.54	September	66.61	60.10	3.14	September	47.26	44.03	3.15
October	66.31	62.91	3.40	October	63.50	60.24	3.26	October	47.52	44.30	3.21
November	67.80	64.36	3.44	November	63.94	60.74	3.19	November	47.83	44.63	3.20
December	68.74	65.18	3.56	December	64.21	60.93	3.26	December	48.41	45.21	3.20
1952				**1957**				**1962**			
January	68.94	65.58	3.36	January	63.86	60.78	3.09	January	48.88	45.74	3.12
February	68.90	65.55	3.35	February	63.58	60.55	3.03	February	49.10	45.96	3.14
March	70.57	67.34	3.22	March	63.34	59.22	3.04	March	49.03	45.86	3.14
April	72.05	68.95	3.10	April	62.04	59.04	3.00	April	48.62	44.82	3.10
May	73.32	69.18	3.14	May	61.51	58.51	3.01	May	48.28	45.22	3.06
June	74.56	71.30	3.26	June	60.47	57.45	3.02	June	47.90	44.90	3.02
July	75.92	72.65	3.28	July	59.38	56.42	2.96	July	47.54	44.35	2.99
August	77.07	73.77	3.30	August	57.21	54.31	2.91	August	47.20	44.28	2.92
September	77.32	74.66	3.16	September	55.75	52.91	2.84	September	46.66	43.73	2.93
October	77.73	74.49	3.24	October	53.68	50.99	2.70	October	46.62	43.65	2.97
November	77.51	74.32	3.19	November	52.24	49.59	2.65	November	46.24	43.33	2.91
December	77.74	74.44	3.30	December	50.74	48.13	2.62	December	45.81	42.95	2.86

Note.—The seasonal factors used in preparing this series were computed by the Bureau of the Census Method II program. A few modifications were made subsequently.